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8 Energy Benchmarking Hurdles (and How to Get Over Them)

Don't let these common obstacles slow you down when it comes to tracking energy use - learn how to benchmark efficiently and effectively

By Leah B. Garris

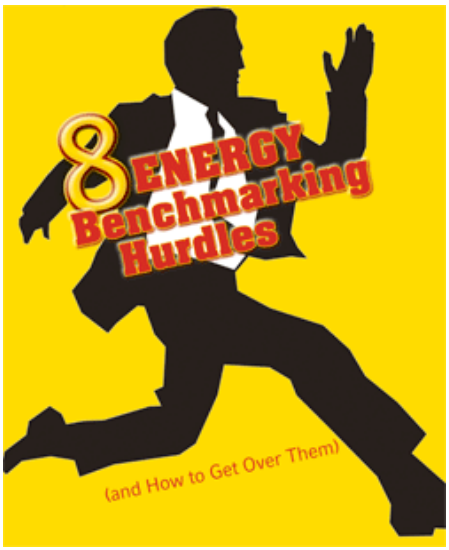
How does your company measure up in terms of industry energy-use averages? If you don't know the answer to this question, you're one step behind - but you're certainly not alone. According to Lawrence Berkeley National Laboratory (LBNL) in Berkeley, CA, most building owners and operators lack basic information about how their properties perform compared to peers or best practices. Benchmarking to obtain this information is crucial as you make decisions about controlling energy use and costs. And, once you wrap your arms around it, "benchmarking energy use doesn't have to be much more difficult than comparing the gas mileage of automobiles," says Steven Carlson, founding principal, CDH Energy Corp., Evansville, WI.

As Christopher Russell, author and director of market outreach, SAIC-Benham, Baltimore, points out, organizations are *not* historically accustomed to managing energy. "Businesses have all kinds of accounting protocols to track cash and other assets; they might have armies of clerks that track $20 receipts for cabs and business lunches, but they have no clue about where their $20 million in annual energy expenditure goes. Energy is wealth, and fuel and power are forms of currency; if money is worth tracking, then so is energy." And, as energy costs escalate, it becomes even more important to track it.

The eight hurdles listed here might get in the way as you attempt to benchmark your building's energy use - but, if you're prepared for what's ahead, you can navigate around them without hesitation.

1. Upper management doesn't understand the results of energy benchmarking enough to support it.

You can benchmark all you want, but if you don't have the support to make things happen as a result of the data you collect, it's not going to do anyone (or any building) any good. "A wide variety of people drive an organization's energy expenses," explains Russell. "This includes people in procurement, finance, and operations. Facilities staff members are still the stars of the show, but energy benchmarking won't make a difference unless the results are properly translated into business-friendly language that non-technical people can appreciate."



Some Tools to Use

Arch (http://poet.lbl.gov/arch). Arch provides a very quick, broad overview of how your building's energy use compares to similar buildings.

Cal-Arch (http://poet.lbl.gov/cal-arch). Cal-Arch is the California version of Arch.

Russell emphasizes that inertia plays a strong role in communicating benchmarking initiatives. Many organizations' work habits and procedures have been in place for years and reflect shortcuts that trade energy for time. "Many of these shortcuts made perfect sense when energy was cheap; as utility prices go up, the tradeoff between time and energy changes. Meanwhile, work habits don't change because facilities staff rarely sees the utility bills. At the same time, the people paying the bills have no clue how energy is used."

Pat Ott, director of property management at Thornton Oliver Keller (TOK), Boise, ID, knows exactly how important communication is. Whether you're a third-party management firm talking to tenants about sustainability measures, or you're trying to get money from the CFO to make improvements, Ott shares this advice: "With measures that have substantial costs associated with them and don't produce a quick return on investment, it's a tough sell. Financial analysis *has* to be attached to almost anything you propose," she advises. "You have to do your homework and show the impact."

Dig up examples of what similar organizations have done and present their successes - and talk about how your organization could do those same things. Stick to the facts and present numbers in terms of ROI; pages of explanation aren't necessary. Using a "we-have-a-problem, here's-a-solution" approach will get the point across quickly and effectively. Data presentation should explain findings and demonstrate how the information can be used to support decisions. Lots of technical speak and numbers that don't relate to return on investment will confuse instead of convince.

Another helpful piece of information to communicate: Convey the likelihood of energy prices increasing by 50 to 100 percent over the next decade, as well as the possibility of carbon-reduction regulation impacting future costs and the nature of building operations, says Peter Garforth, principal at Toledo, OH-based Garforth Intl. Inc. Those bits of news should definitely get *someone's* attention.

2. The motivation behind energy benchmarking at your facility isn't clear.

The list of things that drive an organization to benchmark energy use could be miles long. Don't just jump into benchmarking without knowing your own organization's motivation. It'll help guide what you benchmark (and what you benchmark against).

According to a study conducted by LBNL in 2007, the main reasons given by facilities professionals for benchmarking energy use are: a) to identify energy-efficiency opportunities, b) to prioritize investments, and b) to make comparisons to other facilities.

ENERGY STAR® Portfolio Manager (www.energystar.gov). A widely used tool, Portfolio Manager allows you to track and assess energy consumption across your entire portfolio. Whether you own or manage, or hold properties for investment, Portfolio Manager can help set investment priorities, identify under-performing buildings, verify efficiency improvements, and help your building receive EPA recognition for superior energy performance.

Labs21 (http://labs21.lbl.gov). This tool allows laboratory owners to compare performance of their laboratories to similar facilities, and it helps identify potential opportunities to save on energy costs.

Oak Ridge Benchmarking Building Energy Performance (http://eber.ed.ornl.gov/benchmark). This website allows you to quickly benchmark energy performance on 16 different building types and approximate energy use and cost savings from energy upgrades.

Energy IQ (http://energybenchmarking.lbl.gov).

As Evan Mills, staff scientist at LBNL, points out, there are many other motivations, too:

- To earn a rating (ENERGY STAR®) or gain recognition.
- To make the business case for efficiency investments.
- To track current projects expected to save energy, money, etc.
- To see how a certain building compares to a portfolio or peer group.
- To assess a building's performance before you buy/lease it.
- To present building performance to a potential buyer or lender.
- To set targets for improved performance.
- To facilitate assessment of property value and marketing rental properties.

Currently under way, the pilot version of this tool is being called the next generation of nonresidential energy benchmarking. This "action-oriented" tool provides opportunity assessments based on benchmarking results. The tool supports comparison of the user's building to peers and the tracking of an individual building or portfolio over time.

Garforth indicates that staying ahead of the curve is another motivation for energy benchmarking. As the cost of energy rises and uncertainty over greenhouse-gas regulation continues, people - occupants, the CFO, or the board of directors - will start to raise energy-related questions. Benchmarking is one way to be prepared. "Customers will become more sensitive to the energy performance of buildings, and we can anticipate that they'll demand benchmarking data as part of the lease or sale documentation with the understanding that, if the building fails to perform, there will be some recourse," says Garforth. He also points out that energy benchmarking can become a value-add when it's time to re-lease or re-sell. And, increasingly, companies are publishing their energy and greenhouse-gas data in annual reports for everyone to see.

With impending protocol that may force buildings to cut CO_2 emissions, benchmarking is going to become even more crucial. Effective Jan. 1, 2010, per *California Assembly Bill 1103,* nonresidential building owners in California will have to disclose ENERGY STAR® Portfolio Manager data and scores to prospective buyers/lenders when a building is being sold, leased, or financed/refinanced**.** (See more about ENERGY STAR's Portfolio Manager in the sidebar.) Garforth also believes that financial institutions will eventually require energy-performance data and view operating costs as part of a building's collateral value.

3. You don't know what exactly to benchmark your energy use against because there are so many options.

Comparisons can be broken into two groups: comparing a building to itself from year to year (often called a "historical benchmark") or comparing to a peer group of buildings (either within your portfolio or externally). "A historical benchmark is easy to define since you control the data and know what was going on in the facility over time that might impact energy use," says Carlson. "Historical comparisons are easy to explain to management: 'We improved by X percentage over last year.' " Comparing the energy performance of your building to itself over time can help you trend performance and track energy-efficiency improvements; however, this type of evaluation doesn't help you understand overall building performance and whether it's above, at, or below average.

Looking at a portfolio of buildings within an organization (e.g. multiple retail stores) or an association (e.g. schools within a state) can determine why some perform poorly and some perform well. "It can be a means to develop consistency across all of [your] properties," explains Carlson. And, as Garforth points out, benchmarking against your own portfolio is a good way to get started - it allows you to establish and share best practices.

Benchmarking against a group of similar buildings outside your portfolio is another option, and it might be the most challenging. "Data in the United States is very parochial, and it's hard to get global benchmarks. Also, too often, it's based on theoretical models and *not* on actual building performance," explains Garforth. "There's a sore lack of good databases; this is something that, hopefully, legislative efforts will slowly build [based on] actual performance rather than on modeled assumptions or samples from

somewhat exceptional 'demo' buildings." Garforth insists that, if this approach is used, it should compare against "systematic global best practices rather than only U.S. peer groups of buildings." Doing this allows new questions to emerge about why a building in Europe uses 50- to 100-percent less energy than its average U.S. equivalent.

So, is it ever possible to do an apples-to-apples comparison with another building, given that each one is unique? "Yes, it is," says Garforth, "as long as we're comfortable with a degree of ambiguity around the edges of the data. It's no different than miles per gallon, used to define a car's performance. We all know that different drivers, different fuels, and different roads will change this [number] by as much as 20 percent or more, but the benchmark has value in the regulation, purchase, and management of vehicles."

4. You don't know what data you'll need to make accurate comparisons.

Most benchmarking methods require certain pieces of information, including hours of operation (excluding hours when only maintenance crews, security staff, or other support staff occupy the building) and cooling and heating degree days (CDDs and HDDs).

You'll probably also want to dig up this information and have it handy:

- How facility space is divided and used (e.g. office space vs. data-center space, etc.).
- Gross square footage.
- Occupancy information (e.g. number of tenants, number of beds, etc.).
- Vacancy data.
- A year's worth of energy consumption and cost data for all fuel sources (e.g. electricity, natural gas, etc.). "Energy benchmarking has to start with the bills," says Mills.
- The number of computers being used.
- Information about process loads (i.e. energy-intensive equipment like diagnostic equipment and file servers).
- Conditioned floor area (areas being heated or cooled - not including garages, storage, or other unconditioned spaces). Don't use rentable square footage information, which is a common mistake since it's readily available - that information doesn't include common areas.

For the most part, this information should be easy to gather. But, just because it might be painless doesn't mean it won't be eye-opening - this step usually highlights how little is really known about actual energy flows in a building by time, type, and application, says Garforth.

5. You don't know what features to look for in a benchmarking tool.

One of the best things about benchmarking energy use is that you don't have to reinvent the wheel. There are several free programs for you to use (see *Some Tools to Use*) - some are made for specific building types, some are made for certain regions, etc. It's up to you to pick the one that will work best for what you want to achieve.

As Mills points out, many benchmarking tools/methods can be used without the help of an expert. "It depends on the complexity of the facility. For example, benchmarking a data center, a lab, or a clean room can be a very involved process. It's not for the faint of heart." He explains that most benchmarking tools provide static feedback on how a building compares to a larger set of similar buildings - but don't offer any information on what can be done to reduce energy use. In response to this, LBNL is developing an "action-oriented" benchmarking tool, which will allow users to identify, screen, and prioritize potential efficiency improvements as a result of benchmarking energy use.

As you're shopping for a benchmarking tool, make note of the information required by each program; it varies. Tools that require highly detailed data or expertise may present barriers, so keep that in mind. There are systems available that provide results based on the data entered - the more specific the data going into the system, the more specific the data that comes out.

6. You don't know what to do with the benchmarking data once you have it.

Collecting actionable data is the whole point of benchmarking, but it can be difficult to figure out *how* to take action as a result of the data you gather. As Garforth warns, making decisions about what can be done to bring energy usage down is oftentimes where the most foolish decisions are made. By itself, benchmarking does nothing. The value it brings comes from using the information it reveals to justify and validate energy-efficiency changes.

"Creating an action plan is where the expertise is needed," explains Carlson. "Benchmarking can only tell you your 'score'; it can't tell you how to improve. It hints at potential for improvement, but you still need to figure out where to go." You need an understanding of how your facility is used and the features of systems within your building. There often are operational changes that will improve the efficiency of energy use (matching system operating schedules with use, changing operating parameters with load, etc.). But, most benchmarking tools won't tell you that - it's up to you to make the connection.

Once you have your benchmarking data in hand, conduct an energy-efficiency audit. An assessment like this will help you pinpoint why/where you're losing energy.

As mentioned earlier, LBNL is developing a tool that works from an action-oriented standpoint. According to Mills, "Action-oriented benchmarking provides a quick, low-cost screening process that can flag potential improvements or realistic targets. Ideally, it interoperates with other aspects of building energy management - particularly commissioning and retro-commissioning - where results can help identify deficiencies and suggest where interventions are merited."

7. Numbers can be very misleading.

Is 80 kBTU (energy-use intensity) per square foot per year high or low for a commercial/institutional building? It depends. Where is the building located? What kind of facility is it? What are the hours of operation? How old is the building? How large is the data center? There are even more questions to ask, but you get the drift.

When assessed out of context, numbers can be deceptive. LBNL gives this example: If you use miles per gallon as a way to evaluate modes of transportation, the numbers you come up with suggest that a motorcycle is always the most efficient form of transportation. But, a motorcycle may *not* always be a viable option, especially if you're traveling overseas.

Unfortunately, benchmarking energy use is never clear cut. You run risks of oversimplifying data, not looking at it closely enough, or focusing *too* closely on the data and making connections that aren't there. Don't yield to the temptation of focusing solely on the numbers and whether you're above or below the average.

During the benchmarking process, it's vital that you know what the numbers actually *say* and how they can inform your decisions. "The best recommendation is to look at energy-productivity investments as 4- to 10-year investment programs where the high-return and low-return actions are integrated into a total picture that provides average to above-average returns. This isn't the way we normally do it, which is why there are too many lighting retrofits and not nearly enough building shell rehabs," explains Garforth.

8. You don't know what exactly to benchmark when it comes to energy use.

You can benchmark as specifically or as broadly as you want. High-level metrics at the whole-building level might be adequate for some; in other cases, more detailed metrics are what you're after. Conventional metrics (e.g. energy per unit of floor area) work for some facilities professionals; others will find more significance in numbers that only revolve around CO_2 emissions, for example.

If simplicity is what you're after, and especially if benchmarking energy consumption is new to you, Garforth recommends measuring energy use and/or greenhouse-gas emissions per square foot as a starting point for benchmarking. "It has the benefits of simplicity, ease of understanding, and clarity." Measuring total energy use alone won't provide much insight into how/where to target energy savings, but it's definitely a starting point.

Success Stories

"One particular client [of mine] has many retail stores in a similar geographical region. By simply comparing the electricity use and natural-gas use normalized by floor area, we identified the worst- and best-case facilities. We found a 5:1 range in natural-gas use and a 3:1 range in electricity use, indicating that there ought to be some readily available opportunities to make similar facilities use similar amounts of energy."

—Steven Carlson, Founding Principal, CDH Energy Corp., Evansville, WI

"[Facilities professionals at] the Ada County Courthouse in Boise, ID, benchmarked their building. Their baseline helped them to better understand their building and assisted them in ultimately achieving one of the first LEED-EB certifications in the country. They continue to use the benchmark as a continuous-improvement tool."

—Ken Baker, Owner, K-Energy, Boise, ID

"Texas A&M has had a program for years to track building energy use on campus. They've used the data to show improvements from projects and to spark investigations into system performance."

—Steven Carlson, Founding Principal, CDH Energy Corp., Evansville, WI

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